CLAIMS

What is claimed is:

1. An apparatus, comprising:

a multiple wavelength light source to supply a first broad band of wavelengths for a one or more passive optical networks, wherein the multiple wavelength light source to generate a series of four or more pulses of light in the first broad band of wavelengths, where each pulse of light in that series has a different center wavelength and the series of pulses of light in the first broad band of wavelengths repeat at a channel data rate of an optical receiver at a subscriber's location; as well as

a broadband light source to supply a second broad band of wavelengths to a multiplexer/demultiplexer in a first passive optical network, wherein the multiplexer/demultiplexer to supply a separate spectral slice of the second broad band of wavelengths to a plurality of optical transmitters to wavelength lock an operating wavelength of that transmitter to the wavelength of the injected spectral slice, and an operating range of the second broad band of wavelengths is different than the operating range the first broad band of wavelengths.

2. The apparatus of claim 1, wherein the multiplexer/demultiplexer also distributes pulses from the series of pulses of light to a plurality of optical receivers in the first passive optical network.

3. The apparatus of claim 1, further comprising:

a depolarization device to cause multiple polarization states to exist in each pulse of the series of pulses of light.

4. The apparatus of claim 1, further comprising:

a polarization independent modulator to data modulate the series of pulses of light independent of the polarization of the light in the series.

5. The apparatus of claim 1, wherein the multiple wavelength light source comprises:

two or more pulsed distributed feedback lasers coupled to a second multiplexer, where a first pulsed distributed feedback laser has a center wavelength different from a center wavelength of a second pulsed distributed feedback laser;

a sequence pulse generator coupled to the first pulsed distributed feedback laser and the second pulsed distributed feedback laser, wherein the sequence pulse generator provides timing signals to synchronize the generation and data encoding of the series of pulses of light; and

a modulator to create the series of pulses of light.

6. The apparatus of claim 5, wherein the sequence pulse generator cooperates with the modulator to generate the series of pulses of light with a synchronization marker between an end of a first series of pulses of light and a start of a second series of pulses of light.

7. An apparatus, comprising:

a multiple wavelength light source containing a depolarization device, and a sequence generator, the multiple wavelength light source to generate a light signal that contains a series of multiple wavelengths, where each wavelength has its own center wavelength, and only one center wavelength is present in the light signal at a specific point in time, and the depolarization device to cause each wavelength in the light signal to have multiple polarization states; and

a data modulator to data modulate the light signal independent of the light signal having any particular polarization characteristic, wherein the sequence generator to generate signals to properly synchronize each wavelength in the light signal with the data modulator.

8. The apparatus of claim 7, wherein the multiple wavelength light source comprises:

two or more pulsed distributed feedback lasers coupled through polarization preserving fiber to a multiplexer, where a first pulsed distributed feedback laser has a center wavelength different from a center wavelength of the second pulsed distributed feedback laser; and

a depolarization device coupled through the polarization preserving fiber to the multiplexer.

9. The apparatus of claim 7, wherein the multiple wavelength light source comprises:

two or more pulsed distributed feedback lasers coupled through polarization preserving fiber to a multiplexer, where a first pulsed distributed feedback laser has a center wavelength different than a center wavelength of the second pulsed distributed feedback laser, and

a data modulator coupled to birefringent element through the polarization preserving fiber to the multiplexer.

10. The apparatus of claim 7, wherein the multiple wavelength light source comprises:

a first pulsed distributed feedback laser orthogonally polarized with respect to a second pulsed distributed feedback laser; and

an optical beam combiner coupled to both the first pulsed distributed feedback laser and the second pulsed distributed feedback laser, the optical beam combiner to combine optical signals from the second pulsed distributed feedback laser and the first pulsed distributed feedback laser to create a first wavelength pulse having a center wavelength in the light signal.

11. The apparatus of claim 7, further comprising:

an amplifier in the optical path of the series of multiple wavelengths to amplify each wavelength; and

a power splitter to distribute the amplified series of multiple wavelengths to a plurality of passive optical networks.

12. The apparatus of claim 7, wherein the multiple wavelength light source comprises:

a broadband light source to supply an optical signal containing a broadband of wavelengths; and

a modulator to modulate the optical signal at a rate equal to the channel data rate of an optical receiver at a subscriber's location.

13. The apparatus of claim 7, wherein the multiple wavelength light source further comprises:

an amplifier;

an optical coupler coupled to the amplifier; and

a multiplexer/demultiplexer to spectrally slice the broadband of wavelengths into discrete wavelengths and a plurality of optical paths coupled to the multiplexer/demultiplexer, wherein the multiplexer/demultiplexer to provide time delays to offset each pulse in the broadband of wavelengths.

14. The apparatus of claim 7, wherein the depolarization device is a polarization modulator.

15. The apparatus of claim 7, further comprising:

a power splitter to distribute the light signal to a plurality of passive optical networks.

16. The apparatus of claim 7, wherein the multiple wavelength light source comprises:

a wavelength swept laser to generate the light signal that contains multiple wavelengths;

a birefringent element coupled to the continuous wavelength swept laser; and

a multiplexer coupled to a plurality of optical delay paths to establish time delays in the series of pulses in the light signal.

17. The apparatus of claim 7, further comprising:

a broadband light source to supply a second broad band of wave lengths to a second multiplexer/demultiplexer in a first passive optical network, wherein the second multiplexer/demultiplexer supplies a spectral slice of the second broad band of wave lengths to a plurality of optical transmitters to wavelength lock the operating wavelength of that transmitter to the wavelength of the injected spectral slice.

18. A method, comprising:

generating a modulated optical bit stream that is wave division multiplexed and time division multiplexed, where the modulated optical bit stream is

modulated at a time division multiplexing rate of at least three times a channel data rate of an optical receiver at a subscriber's location;

routing the modulated optical bit stream to two or more passive optical networks; and

controlling the polarization characteristics of the light in the modulated optical bit stream to data modulate the modulated optical bit stream independent of the light having any particular polarization characteristic.

19. The method of claim 18, further comprising:

supplying a broad band of wave lengths to a first passive optical network, wherein a separate spectral slice of the broad band of wave lengths is distributed to a plurality of optical transmitters to wavelength lock the operating wavelength of that transmitter to the wavelength of the injected spectral slice, and an operating range of the second broad band of wavelengths is different than the operating range the first broad band of wavelengths.

20. The method of claim 18, wherein each optical bit is offset in center wavelength and in time from another optical bit and a sequence of the optical bits in the optical bit stream is repeated at the channel data rate of the optical receiver at the subscriber's location.

21. The method of claim 18, further comprising:

amplifying the each bit in the optical bit stream; and

distributing the amplified optical bit stream to the plurality of passive optical networks.

22. An apparatus, comprising:

means for generating a modulated optical bit stream that is wave division multiplexed and time division multiplexed, where the modulated optical bit stream is modulated at a time division multiplexing rate of at least three times a channel data rate of an optical receiver at a subscriber's location;

means for routing the modulated optical bit stream to two or more passive optical networks; and

means for controlling the polarization characteristics of the light in the modulated optical bit stream to data modulate the modulated optical bit stream independent of the light having any particular polarization characteristic.

23. The apparatus of claim 22, further comprising:

means for supplying a broad band of wave lengths to a first passive optical network, wherein a separate spectral slice of the broad band of wave lengths is distributed to a plurality of optical transmitters to wavelength lock the operating wavelength of that transmitter to the wavelength of the injected spectral slice, and an operating range of the second broad band of wavelengths is different than the operating range the first broad band of wavelengths.

24. The apparatus of claim 22, wherein each optical bit is offset in center wavelength and in time from another optical bit and a sequence of the optical bits in the optical bit stream is repeated at the channel data rate of the optical receiver at the subscriber's location.

25. The apparatus of claim 22, further comprising:

means for amplifying the each bit in the optical bit stream; and

means for distributing the amplified optical bit stream to the plurality of passive optical networks.

26. An apparatus, comprising:

a multiple wavelength light source containing a depolarization device, the multiple wavelength light source to generate a light signal that contains a series of multiple wavelengths, where each wavelength has its own center wavelength, and only one center wavelength is present in the light signal at a specific point in time, and the depolarization device to cause each wavelength in the light signal to have multiple polarization states; and

a data modulator to data modulate the light signal independent of the light signal having any particular polarization characteristic, wherein the data modulator has a detector to recover the synchronization data for series of pulses to properly synchronize each wavelength in the light signal with the data modulator.

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